Art. IX.—*Newer Pliocene Strata on the Moorabool River.*

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(Communicated by J. Dennant, F.G.S., F.C.S.).

[Read 10th October, 1901.]

A paper read by Messrs. Hall and Pritchard in June, 1897, before this Society, was the cause of several excursions to the Moorabool River, in the neighbourhood of the Viaduct, by members of the Geelong Field Naturalists' Club, the object being to find the Miocene outcrop therein described. The search, as we afterwards found, was on the wrong side of the river, but on the opposite, or eastern bank, a new fossil bed was discovered, which is so interesting that I have asked permission to bring it under the notice of the Royal Society. This deposit consists of a layer of sandy gravel, about 20 feet thick, directly underlying the basalt which tops the hills on both sides of the river. The gravel bed is nearly on a level with the Viaduct, and is full of calcareous casts of fossils. In the light of Mr. Pritchard's identifications of the fossil casts in the ironstone near at hand, we at first thought the deposit to be a Miocene one, but, as will be shewn presently, this is not the case. To prove definitely whether the shells lie actually under the basalt, or simply rest against it on the side of the hill, we followed the river up for about 40 chains until we came to a road running at right angles to the river as well as to the above-mentioned deposit higher up the bank. This road leads right up to the basaltic plain, and, in following it from the river, we first came to rotten limestone with a few fragments of Eocene shells (the basal bed), and on climbing still higher we encountered the continuation of the same gravel bed, with calcareous casts of shells, as that previously mentioned, and with basalt also resting upon it. I obtained photographs of these two sections and shewed them to Mr. T. S.

Hall, who at once said that they represented a new bed and not the one he and Mr. Pritchard had described, which is on the west side of the river. The shell casts were submitted to Mr. Dennant last year, who said that they appeared to consist of living species rather than of those proper to the Miocene, and recommended me to send them to Professor Tate for definite determination. This was done, and, with his usual good nature, the Professor, whose recent death must be deplored by all of us, wrote to me at some length upon the material forwarded. I give Professor Tate's remarks in his own words :—"The majority of the mollusca are in the state of pseudomorphs after calcite, and the fine ornament in the majority of cases is obliterated; this renders critical comparison hardly possible. At a first glance it seemed that the collection might belong to any period, from Miocene to Recent. However, selecting the species shewing the most determinate characters, I proceeded to ascertain their species names, and, after comparison with related species, recent and fossil, I arrived at the conclusion that I had essentially a modern fauna to deal with. This gave me a clue to the determination of the obscure forms, though in their case, as with the others, all available sources of comparison were utilised. The result is that of 13 species, to which approved names have been given,[1] 12 are recent species, and are to be found as cast-up shells on the beaches of Southern Australia. The extinct species is Pecten antiaustralis, which, however, extends from its commoner habitat of Miocene to Older Pliocene; it is one of the very few which pass up from the Older Tertiary to just within touch of the Recent.

In conclusion, (1) The faunula is essentially recent, and, though one out of thirteen is not actually known living, it would be misleading to apply the percentage test on such low figures as an index to age, and it is not improbable that, if the list were extended to a hundred, 99 per cent. would be recent. The deposit is synchronous with that of Limestone Creek described by Mr. Dennant, and if from that faunula we subtract the species

1 Four others were subsequently named by Professor Tate, and the list now contains 17 named species.

of extraneous origin the general results are identical. The time horizon may be indicated by Older Pleistocene.[1]

(2) The faunula belongs to shallow water, not absolutely littoral, but the depth indicated by the species was not beyond the influence of wave disturbance in rough weather.

(3) The mineralization of the fossils must not be regarded as evidence of greater antiquity than the corresponding deposit at Limestone Creek, wherein the tests are unaltered."

Professor Tate's determinations are the following :—

Purpura textiliosa, Lam.
Siphonalia tasmaniensis, Adams and Angas
Nassa lyrella, Beck
Nassa fasciata, Lam.
Batillaria cerithium, Quoy
Turritella clathrata, Kiener
Natica plumbea, Lam.
Risella plana, Quoy
Ostrea angasi, Sow.
Ostrea mordax, Gould
Pecten antiaustralis, Tate
Mytilus magellanicus, Lam. (?)
Mytilus planulatus, Lam.
Meretrix alatus, Reeve
Corbula scaphoides, Hinds
Barnea australasiae, Sow.
Teredo tube.
Magellania flavescens, Lam.
Balanus, sp.

A very important conclusion follows from the fossil evidence here produced, namely, that the age of the superincumbent basalt is brought still nearer to our own times; it cannot be older than Newer Pliocene, and may even be Pleistocene.

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1 The Limestone Creek beds are by Mr. Dennant assigned to the Newer Pliocene, the extraneous origin of some shells in the deposit being, he says, a surmise only, and not demonstrable from an examination of the sections. Following him, I call the Moorabool bed Newer Pliocene.